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PATENT ABSTRACTS OF JAPAN

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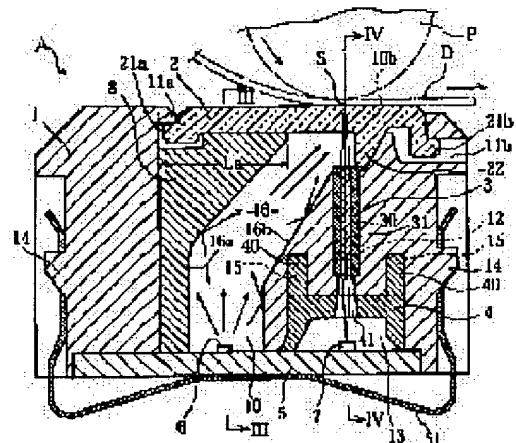
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(54) IMAGE READER

(57)Abstract:

PROBLEM TO BE SOLVED: To properly prevent with a simple means the occurrence of deteriorated image quality for a read image caused by warping deformation of a lens array.

SOLUTION: This image reader A is provided with a case 1, a transparent board 2 mounted on the case 1, a light source 6 that emits light to a linear image read area S on the surface of the transparent board 2, and a lens array 3 having a plurality of image-forming lenses 31 that focus a light reflected from an original D placed on the image read area S on a plurality of light-receiving elements 7 placed as an array to form an image of the original D. The lens array 3 is contained in a groove 12 provided in the case 1 and faces opposite the transparent board 2. In this case, a projection 22, in press contact with the lens array 3 toward a bottom of the groove 12, is formed on a rear side of the transparent board 2 and the transparent board 2 is preferably made of synthetic resin.



CLAIMS

[Claim(s)]

[Claim 1] A case, the transparency plate with which this case was equipped, and the light source which irradiates light to the image reading field of the shape of Rhine of the front face of this transparency plate, The lens array which has two or more lenses for image formation for converging the light reflected from the manuscript arranged to the above-mentioned image reading field on two or more photo detectors allotted to seriate, and carrying out image formation of the image of the above-mentioned manuscript is provided. This lens array is an image reader which was held in the slot prepared in the above-mentioned case, and has countered the above-mentioned transparency plate. And in the rear face of the above-mentioned transparency plate The image reader characterized by forming the height which contacts the above-mentioned lens array possible [press] in the direction of a pars basilaris ossis occipitalis of the above-mentioned slot in the above-mentioned lens array.

[Claim 2] It is the image reader according to claim 1 with which the overall-length region at the tip of the above-mentioned height is in contact with the side edge section prolonged in the longitudinal direction of the end side of the above-mentioned holder by prolonging the above-mentioned height in the longitudinal direction of the above-mentioned transparency plate in the shape of a straight line, and forming it in it while the above-mentioned lens array has the configuration with which two or more above-mentioned lenses for image formation were put in order and held seriate at the holder prolonged in the shape of a straight line.

[Claim 3] The image reader according to claim 1 or 2 with which 1 set or two or more sets of engagement means to make the above-mentioned transparency plate hang on the above-mentioned case so that it may regulate that the above-mentioned transparency plate moves in the direction which deserts the above-mentioned lens array are formed in the peripheral wall section of the above-mentioned transparency plate and the above-mentioned opening while opening which the above-mentioned transparency plate inserts in the above-mentioned case is formed.

[Claim 4] The above-mentioned transparency plate is an image reader according to claim 1 to 3 which is a product made of synthetic resin.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] The invention in this application relates to the image reader used for it being included in facsimile apparatus or various kinds of scanner equipments, and reading a manuscript image.

[0002]

[Description of the Prior Art] The general configuration of the conventional image reader is shown in drawing 6. This image reader equips the top-face section of a case 90 with the plate-like transparency plate 97 called cover glass, and the substrate 92 in which two or more LED light sources 91 were carried, the lens array 93 which tied two or more lenses for image formation to a single string, and the substrate 95 in which two or more photo detectors 94 were carried are attached to the interior of this case 90. Two or more above-mentioned LED light sources 91 separate spacing suitable on a substrate 92, and are put in order by the single tier so that light can be irradiated to the image reading field Sa of the shape of Rhine of the front face of the transparency plate 97. The above-mentioned lens array 93 is inserted in the slot 98 formed in the above-mentioned case 90.

[0003] In this image reader, if the light irradiated towards the image reading field Sa from two or more LED light sources 91 is reflected by Manuscript D, after that reflected light converges with a lens on each image formation of the lens array 93, it will be received by two or more photo detectors 94. The photo detector 94 of these plurality outputs the picture signal of the output level corresponding to the light income. therefore, the image of Manuscript D -- every one line -- a ** -- it can read.

[0004] In the above-mentioned conventional image reader, the clearance S3 is formed between the top face of the lens array 93, and the rear face of the transparency plate 97. In order to carry out image formation of the image of Manuscript D appropriately on a photo detector 94 with each lens of the lens array 93, in the former, it considered as such a configuration because it was necessary to set the distance L from the front face of the transparency plate 97 to the top face of the lens array 93 as a predetermined distance corresponding to the property of a lens. Although it became possible to lose the above-mentioned clearance S3 when the thickness of the whole transparency plate 97 was very large, in the former, from a viewpoint of low-cost-izing of components, or lightweight-izing etc., the actual condition uses the thing comparatively thin as a transparency plate 97, and the clearance S3 was inevitably formed between the above-mentioned lens array 93 and the transparency plate 97.

[0005]

[Problem(s) to be Solved by the Invention] However, the following faults were produced in the above-mentioned conventional image reader.

[0006] That is, since the above-mentioned lens array 93 was formed in the ***** configuration which bends and is easy to produce deformation, when a temperature change arose in the periphery of the lens array 93 at the time of use of an image reader, as shown in the imaginary line of drawing 7, it had the case where the lens array 93 bent in the direction of the above-mentioned clearance S3, and produced deformation (curvature deformation). Moreover, when an image reader was assembled and it was not pushed in appropriately in the above-mentioned lens array 93 fang-furrow section 98, there was also a possibility that it might be attached in a case 90 while the lens array 93 had produced bending deformation as mentioned above. Consequently, in the former, it could originate in deformation of such a lens array 93, the location gap of each lens of the lens array 93 could arise, image formation of the manuscript image could not be carried out appropriately on a photo detector 94, and there was a case where the so-called blur was produced in a reading image.

[0007] The invention in this application makes it the technical problem to enable it to prevent

appropriately the situation where are invented under such circumstances, originate in curvature deformation of a lens array, read, and the quality of an image deteriorates, with a simple means.

[0008]

[Description of the Invention] In order to solve the above-mentioned technical problem, the following technical means are provided in the invention in this application.

[0009] The image reader offered by the invention in this application A case, the transparence plate with which this case was equipped, and the light source which irradiates light to the image reading field of the shape of Rhine of the front face of this transparence plate, The lens array which has two or more lenses for image formation for converging the light reflected from the manuscript arranged to the above-mentioned image reading field on two or more photo detectors allotted to seriate, and carrying out image formation of the image of the above-mentioned manuscript is provided. This lens array is an image reader which was held in the slot prepared in the above-mentioned case, and has countered the above-mentioned transparence plate. And in the rear face of the above-mentioned transparence plate The above-mentioned lens array is characterized for the height which contacts the above-mentioned lens array possible [press] to be formed in the direction of a pars basilaris ossis occipitalis of the above-mentioned slot.

[0010] In the invention in this application, the above-mentioned lens array is maintainable in the condition of having pressed in the direction of a pars basilaris ossis occipitalis of the above-mentioned slot, by being in contact with the lens array by which the height of a transparence plate is held in the slot of a case. Therefore, even if it is the case where a temperature change arises in the periphery of the above-mentioned lens array unlike the former, it originates in it and the above-mentioned lens array can be prevented from producing curvature deformation easily. Moreover, when a case is equipped with a transparence plate on the occasion of the assembly of an image reader, the height of this transparence plate will contact a lens array, a lens array can be pressed, and it also enables it to cancel to be attached to a case, while the lens array had produced curvature deformation. Consequently, in the invention in this application, a possibility that it may originate in deformation of a lens array and a location gap may arise on each lens for image formation is abolished, or it lessens, and a reading image with high quality with few so-called blurs is obtained, and the thing of it can be carried out.

[0011] Moreover, since the height of a transparence plate is made to contact a lens array, it is not necessary to enlarge thickness of the whole transparence plate, and if the part in which the height is formed is partially made heavy-gage, it is sufficient [the invention in this application]. Therefore, enlargement of a transparence plate, increase-ization of weight, etc. can be controlled as much as possible.

[0012] With the gestalt of desirable operation of the invention in this application, while the above-mentioned lens array has the configuration with which two or more above-mentioned lenses for image formation were put in order and held seriate at the holder prolonged in the shape of a straight line, the above-mentioned height is prolonged in the longitudinal direction of the above-mentioned transparence plate in the shape of a straight line, and is formed in it, and the overall-length region at the tip of the above-mentioned height is in contact with the side edge section prolonged in the longitudinal direction of the end side of the above-mentioned holder.

[0013] According to such a configuration, since the height and the lens array of a transparence plate can be made to contact over the long dimension field of the longitudinal direction of a lens array, it will become desirable by preventing curvature deformation of a lens array. Variation seems moreover, to originate in the difference of physical relationship with a lens array and the height of a transparence plate, and to be able to avoid being generated in the incidence situation of the light to the lens for image formation etc., since the relative physical relationship of a lens array and the height of a transparence plate can also be arranged with

the everywhere same conditions in the longitudinal direction of a lens array. Therefore, it becomes convenient reading a manuscript image faithfully. Furthermore, since the height of a transparency plate is made to contact the side edge section of the holder of a lens array, the above-mentioned height can be prevented from covering the lens for image formation of a lens array. Therefore, without it seeming that the light reflected from the manuscript passes the height, or is interrupted by the height, direct incidence can be carried out to the lens for image formation, and it becomes possible to read a manuscript image more faithfully.

[0014] With the gestalt of other desirable operations of the invention in this application, while opening which the above-mentioned transparency plate inserts in the above-mentioned case is formed, 1 set or two or more sets of engagement means to make the above-mentioned transparency plate hang on the above-mentioned case so that it may regulate that the above-mentioned transparency plate moves in the direction which deserts the above-mentioned lens array are formed in the peripheral wall section of the above-mentioned transparency plate and the above-mentioned opening.

[0015] According to such a configuration, the transparency plate to a case can be easily attached by making a transparency plate insert in opening of a case, and making a transparency plate hang on a case using 1 set or two or more sets of engagement means. According to the force, it can avoid pushing the above-mentioned transparency plate in the direction which deserts a lens array, and the above-mentioned engagement means can force a lens array appropriately in the slot of a case, even if the force in which a lens array tends to produce curvature deformation towards a transparency plate in order to regulate that a transparency plate moves in the direction which deserts a lens array occurs.

[0016] With the gestalt of other desirable operations of the invention in this application, the above-mentioned transparency plate is a product made of synthetic resin.

[0017] According to such a configuration, it can also perform easily being able to form easily the transparency plate which has the height with resin shaping, and forming an engagement means in the above-mentioned transparency plate. Therefore, manufacture of a transparency plate can be made easy and the manufacturing cost can be made cheap.

[0018] About other descriptions and advantages of the invention in this application, it will become clearer from explanation of the gestalt of implementation of the following invention.

[0019]

[Embodiment of the Invention] Hereafter, the gestalt of desirable operation of the invention in this application is explained concretely, referring to a drawing.

[0020] Drawing 1 is the sectional view showing an example of the image reader concerning the invention in this application. Drawing 2 is the II-II sectional view of drawing 3 . Drawing 3 is III-III of drawing 1 . It is a sectional view. Drawing 4 is the IV-IV sectional view of drawing 1 . Drawing 5 is the decomposition perspective view of the image reader shown in drawing 1 thru/or drawing 4 .

[0021] Image reader A of this operation gestalt is constituted as the so-called contact type image sensor. In drawing 1 , this image reader A possesses a case 1, the transparency plate 2, the light reflex member 8, the lens array 3, the light reflex prevention member 4, a substrate 5, two or more LED chips 6, two or more photo detectors 7 and 1, or two or more attachments 51, and is constituted.

[0022] The above-mentioned case 1 has the gestalt prolonged in the fixed direction as it appears in drawing 5 well. The quality of the material of this case 1 is the synthetic resin which made the polycarbonate contain titanium oxide, and the color of that resin is white. Therefore, it is white everywhere [of this case 1 / all]. The rate of a light reflex of the front face of this case 1 is 90% - about 98% of high value. It extends in the longitudinal direction of this case 1, and the pore 10 penetrated in the thickness direction of the case 1 of a parenthesis is formed in this case 1. This pore 10 is a part for forming the optical path 16 for lighting so that it may mention later.

[0023] The above-mentioned transparency plate 2 is a product made of synthetic resin with

the high transparency of for example, acrylic resin etc., and the outline configuration of the whole in plane view is formed in the shape of a ** length rectangle. However, two or more projections 21a and 21b for engagement separate suitable spacing in the two side edge sections 20a and 20b prolonged in the longitudinal direction of this transparency plate 2, and are prepared in them. Moreover, the height 22 projected in the shape of facing down is prolonged in the longitudinal direction of this transparency plate 2, and is formed in the rear face (inferior surface of tongue) of this transparency plate 2 at a single string. The above-mentioned height 22 is used for forcing the lens array 3 so that it may mention later.

[0024] The above-mentioned transparency plate 2 is inserted in this top opening 10b so that top opening 10b of the above-mentioned pore 10 may be blockaded, as it appears in drawing 1 well. Two or more projection 11a for engagement and two or more crevice 11b for engagement are formed in the peripheral wall section of the above-mentioned top opening 10b. Two or more above-mentioned projections 11a, 21a, and 21b for engagement and two or more crevice 11b for engagement are equivalent to an example of the engagement means as used in the field of the invention in this application, and each above-mentioned projection 21a for engagement is being engaged from the lower part to each above-mentioned projection 11a for engagement. On the other hand, each projection 21b for engagement is inserted into each crevice 11b for engagement. Thereby, the above-mentioned transparency plate 2 is hung on the case 1 so that it may not escape and separate to the upper part of a case 1. In addition, the width of face of the part in which the projections 21a and 21b for engagement of the above-mentioned transparency plate 2 are formed is larger than the width of face of the above-mentioned top opening 10b. Therefore, when attaching the above-mentioned transparency plate 2 to a case 1, after expanding the width of face of the above-mentioned top opening 10b by applying the force to the upper part of a case 1, and carrying out elastic deformation of the part, the above-mentioned transparency plate 2 is made inserted in the above-mentioned top opening 10b. A platen roller P is arranged in the location which counters the front face (top face) of the above-mentioned transparency plate 2, and Manuscript D is transported along the front face of the above-mentioned transparency plate 2 by this platen roller P.

[0025] The above-mentioned lens array 3 makes much SELFOC lenses 31 for image formation put in order and hold seriate to the holder 30 made of synthetic resin formed in the shape of [which is prolonged in the shape of a straight line / *****] a block. This lens array 3 is inserted in the slot 12 of the shape of top-face opening formed in the above-mentioned case 1, and is arranged under the above-mentioned transparency plate 2. The height 22 of the above-mentioned transparency plate 2 is in contact with the top face of this lens array 3. Thereby, the above-mentioned lens array 3 is forced below so that it may not come floating upwards. However, the above-mentioned height 22 has contacted only to the 1 side edge section prolonged in the longitudinal direction of this holder 30 among the top faces of a holder 30 so that the SELFOC lens 31 may not be covered. Moreover, the overall-length region at the tip of the above-mentioned height 22 is in contact with a single string to the abbreviation overall-length region except the both ends of the longitudinal direction of a holder 30 as it appears in drawing 4 well. In drawing 1, the right above field of the above-mentioned lens array 3 is the image reading field S among the front faces of the above-mentioned transparency plate 2, and this image reading field S is a field of the shape of Rhine prolonged in the above-mentioned lens array 3 and this direction.

[0026] Two or more above-mentioned photo detectors 7 have a photo-electric-conversion function, and if the light which has passed two or more SELFOC lenses 31 of the lens array 3 from the image reading field S is received, they will output the picture signal of the output level corresponding to the light income. The photo detector 7 of these plurality is put in order and mounted in seriate along with the longitudinal direction of the above-mentioned substrate 5 on the surface of [of the above-mentioned substrate 5] facing up. Down the stowed position of the lens array 3 of the above-mentioned case 1, the space room 13 of the

shape of pars-basilaris-ossis-occipitalis opening prolonged in the lens array 3 and this direction is formed. Two or more above-mentioned photo detectors 7 are arranged in the above-mentioned space room 13 by attaching a substrate 5 to the bottom surface part of a case 1. As for the above-mentioned substrate 5, the attachment maintenance to the pars basilaris ossis occipitalis of the above-mentioned case 1 is made by the above-mentioned attachment 51. By being hung on the heights 14 and 14 formed in the lateral surface of a case 1, the above-mentioned attachment 51 is constituted so that the bottom surface part of the above-mentioned substrate 5 may always be pressed upwards.

[0027] The above-mentioned light reflex prevention member 4 is black ABS plastics or the black product made from a polycarbonate, and the front face in each place has become what has the low reflection factor of light. This light reflex prevention member 4 has the array die length of two or more above-mentioned photo detectors 7, an abbreviation EQC, or the die length beyond it, and the general cross-section configuration of that longitudinal direction has the shape of an abbreviation KO character which placed opening upside down. As this light reflex prevention member 4 surrounds the perimeter of two or more above-mentioned photo detectors 7, it is inserted in the above-mentioned space room 13. However, the slit 41 whose advance turns to two or more photo detectors 7 the light which has passed the lens array 3, and is enabled is formed in this light reflex prevention member 4. Anchoring of the light reflex prevention member 4 to a case 1 is performed by making the crevice 15 formed successively in the upper part of the space room 13 carry out fitting of the height 40 prepared in the top-face section of this light reflex prevention member 4. [two or more]

[0028] Two or more above-mentioned LED chips 6 are equivalent to an example of the light source, and are mounted in the same field as the front face of the above-mentioned substrate 5, i.e., the field where two or more photo detectors 7 of the above-mentioned substrate 5 are mounted. The LED chip 6 of these plurality is arranged in seriate by the longitudinal direction of a substrate 5 in the predetermined pitch so that the luminescence field of the shape of Rhine prolonged in a main scanning direction can be formed.

[0029] The above-mentioned substrate 5 is for example, a product made from a ceramic, or a product made of an epoxy resin. The circuit pattern (illustration abbreviation) for performing I/O of the electric power supply to the LED chip 6 and two or more photo detectors 7 of the above-mentioned plurality or various kinds of signals is formed in the front face of this substrate 5, and wiring connection with an external instrument can be made now through a connector 50 as it appears in drawing 5 well. Although the drawing top is omitted, the boundary region where two or more above-mentioned LED chips 6 are mounted among the front faces of the above-mentioned substrate 5 is made into white with the high reflection factor of light, and let the other field be black with the low reflection factor of light. In drawing 1, the surface part of the substrate 5 which counters the space room 13 is a black field.

[0030] The above-mentioned light reflex member 8 is the white product made of resin which made the polycarbonate contain titanium oxide like the above-mentioned case 1, and the front face of each part is the white side where the reflection factor of light is high. The side-attachment-wall sections 80 and 80 projected in the direction where this light reflex member 8 is prolonged, and the direction which intersects perpendicularly are formed in the longitudinal direction both ends of this light reflex member 8 as it appears in drawing 5 well. The above-mentioned light reflex member 8 is held in the pore 10 of the above-mentioned case 1, and positioning of the above-mentioned light reflex member 8 is achieved by inserting in narrow-width partial 10a by which lower 8a of the longitudinal direction edge of the above-mentioned light reflex member 8 was prepared in the lower part of the longitudinal direction both ends of the pore 10 of a case 1 as it appears in drawing 2 well.

[0031] In this image reader A, the space section of the remainder in which the above-mentioned light reflex member 8 was held among the pores 10 of the above-mentioned case 1 is made into the optical path 16 for lighting. In drawing 1, the space field between the top face of the lens array 3 and the rear face of the transparency plate 2 located in right above [of

it] is also made into a part of optical path 16 for lighting. The wall surfaces 16a and 16b prolonged in the longitudinal direction of the case 1 of the above-mentioned optical path 16 for lighting are formed of one side face of the above-mentioned light reflex member 8, and the 1 side-attachment-wall side of the above-mentioned pore 10. Two or more above-mentioned LED chips 6 are arranged at the lower part of this optical path 16 for lighting. Since this optical path 16 for lighting is a part for leading the light emitted from two or more LED chips 6 to the image reading field S, let those parts at least be inclined planes so that you can advance the wall surfaces 16a and 16b of this optical path 16 for lighting towards the image reading field S by reflecting the light emitted from two or more LED chips 6. The above-mentioned wall surfaces 16a and 16b continue being white sides where both the rates of a light reflex are high. The surface field of the substrate 5 which counters the above-mentioned optical path 16 for lighting is also white.

[0032] The longitudinal direction both ends of the above-mentioned optical path 16 for lighting are prescribed by one side face 81 of each side-attachment-wall section 80 of the above-mentioned light reflex member 8, and this one side face 81 and the wall surface 17 of the case 1 formed in the shape of abbreviation flat-tapped as it appears in drawing 3 well. These fields 81 and 17 are also white sides where the reflection factor of light is high. Point 80a of each side-attachment-wall section 80 of the above-mentioned light reflex member 8 is advancing between the longitudinal direction edge of the lens array 3, and the longitudinal direction edge of the transparency plate 2, and is suppressing the longitudinal direction both ends of the lens array 3 below as it appears in drawing 2 and drawing 4 well. This will play the role which assists the height 22 of the transparency plate 2 which suppresses the lens array 3 below. Moreover, 1 side-face 81 of above-mentioned point 80a has met the optical path 16 for lighting between the above-mentioned lens array 3 and the transparency plate 2 by arranging point 80a of each above-mentioned side-attachment-wall section 80 above the lens array 3 in this way.

[0033] Next, an operation of the above-mentioned image reader A is explained.

[0034] First, in drawing 1, among the light emitted from two or more LED chips 6, the part turns the inside of the optical path 16 for lighting to the image reading field S, and advances directly. Moreover, the light of other most is efficiently irradiated by the image reading field S, being reflected by the wall surfaces 16a and 16b of the white prolonged in the longitudinal direction of the optical path 16 for lighting with a high reflection factor. On the other hand, as shown in drawing 3, the light emitted from two or more above-mentioned LED chips 6 advances with breadth also to the longitudinal direction of the optical path 16 for lighting. The light which advanced towards the longitudinal direction both ends of the optical path 16 for lighting is reflected by the side faces 81 and 81 of the white of the side-attachment-wall sections 80 and 80 of the light reflex member 8 with a high reflection factor, and a part of the reflected light arrives at the image reading field S. In this case, many of light reflected near the upper part of the above-mentioned side faces 81 and 81 and the upper part advances towards the longitudinal direction both ends of the image reading field S. Since side-face 81 of point 80a of each above-mentioned side-attachment-wall section 80 a is located up and is approaching the image reading field S rather than the lens array 3 as especially shown in drawing 2 and drawing 4, the light which reached the above-mentioned side-face 81a is efficiently reflected towards the longitudinal direction edge of the image reading field S. Therefore, the exposure of the light to the longitudinal direction both ends of the image reading field S can be increased. When light is generally irradiated to a Rhine-like image reading field using the light source which emits light to a line, the inclination for the exposure quantity of light to the longitudinal direction edge of an image reading field to become less than the exposure quantity of light of a longitudinal direction center section considerably is strong. However, in this image reader A, such fault is canceled and it becomes possible to attain equalization of the exposure quantity of light to longitudinal direction every place of the image reading field S.

[0035] In above-mentioned image reader A, the protection-from-light field La where the exposure of light was prevented is formed in the inferior surface of tongue of the transparency plate 2 of the upper part of the light reflex member 8. This protection-from-light field La plays the role which prevents that light is vainly irradiated by the part which is considerably distant from the image reading field S among each part of the transparency plate 2. Therefore, it becomes possible to raise more the exposure effectiveness of the light to the image reading field S.

[0036] It is reflected by the front face of the manuscript D located in this image reading field S, and after the light which advanced to the above-mentioned image reading field S penetrates each SELFOC lens 31 of the lens array 3 after that and advances in the space room 13, it is received by two or more photo detectors 7. Since each above-mentioned SELFOC lens 31 is not covered with the height 22 of the transparency plate 2, as it is not influenced of the height 22 of the transparency plate 2, it can carry out incidence suitable for each SELFOC lens 31 about the reflected light from the above-mentioned manuscript D.

[0037] Moreover, the above-mentioned height 22 is in contact with the longitudinal direction to the lens array 3 at a single string, and that of the relative physical relationship of the lens array 3 and the height 22 is uniform in longitudinal direction every place of the lens array 3. For this reason, it results from the variation in the physical relationship of the lens array 3 and the height 22, and can avoid also producing fault which variation produces in the illuminance of the image reading field S, or variation produces in the incidence situation of the light to the SELFOC lens 31. When the above-mentioned height 22 is formed intermittently, the method of advance of the light which goes to the image reading field S is more specifically different in the optical path 16 for lighting in the part in which the height 22 exists, and the part in which the height 22 does not exist. Moreover, the conditions in which the light reflected from Manuscript D carries out incidence to the SELFOC lens 31 will also be different. However, such a thing can be abolished in this image reader A.

[0038] Since the perimeter of two or more above-mentioned photo detectors 7 is covered with the black light reflex prevention member 4 with the low rate of a light reflex, it is controlled that the reflected light from Manuscript D carries out scatter reflection in the perimeter of two or more above-mentioned photo detectors 7. Therefore, it can also be prevented that the scattered light carries out incidence to each photo detector 7, it can read also according to such a thing, and the quality of an image can be raised.

[0039] In above-mentioned image reader A, change arises in the ambient temperature of the lens array 3 during the use, and even if it is going to produce curvature deformation so that the longitudinal direction center section of the lens array 3 may be raised upwards, such deformation can be appropriately prevented by the height 22 of the transparency plate 2. When the above-mentioned lens array 3 tends to produce curvature deformation, the transparency plate 2 receives the force pushed up upwards by this lens array 3, but since the above-mentioned transparency plate 2 is hung on the condition that the migration to the upper part of a case 1 was regulated by the case 1, it can prevent deformation of the above-mentioned lens array 3 appropriately. Moreover, although it attaches the transparency plate 2 to a case 1 in the condition of making the lens array 3 inserting in the slot 12 of a case 1 in assembling the above-mentioned image reader A, the height 22 of the transparency plate 2 will press the top face of the lens array 3 inevitably at the time of attachment of this transparency plate 2. Therefore, it also becomes possible to turn the lens array 3 to the pars basilaris ossis occipitalis of a slot 12, and to push it in certainly, and a possibility that it may be attached to a case 1 while it has been in the condition by which the lens array 3 was bent can also be canceled. Therefore, the location of each SELFOC lens 31 of the lens array 3 can be set as a proper location, and image formation of the image of Manuscript D can be carried out suitable for the condition that there is no blur on a photo detector 7.

[0040] the concrete configuration of each part of the image reader concerning the invention in this application is not limited to an above-mentioned operation gestalt, but a design change is

free for it to versatility.

[0041] For example, with the above-mentioned operation gestalt, although he is trying for the height of a transparency plate not to cover the lens for image formation of a lens array, the invention in this application is not limited to this. In the invention in this application, it may be in contact with the lens array so that the height of a transparency plate may cover the lens for image formation, for example. When the transparency of a transparency plate is high, even if it is the case where the height is made to contact on everywhere equal conditions to two or more lenses for image formation, it is possible to perform good image reading. Therefore, in the invention in this application, especially the concrete cross-section configuration or the size of the above-mentioned height are not limited, either. Moreover, in the invention in this application, a means to paste up a transparency plate on a case, for example, using adhesives as a means to equip a case with a transparency plate may be adopted.

[0042] Furthermore, with the above-mentioned operation gestalt, in a case 1, although the exposure effectiveness of the light to an image reading field is raised as a white product made of resin, the invention in this application is not too limited to this, for example, the case made of black resin may be used like the image reader of the general former. It is not limited to what the configuration of the light source also consisted of using two or more LED chips, for example, the invention in this application can use the various light sources, such as a cold cathode tube. Moreover, as a lens array, the thing not only using what used the SELFOC lens as a lens for image formation but a convex lens may be adopted.

TECHNICAL FIELD

[Field of the Invention] The invention in this application relates to the image reader used for it being included in facsimile apparatus or various kinds of scanner equipments, and reading a manuscript image.

PRIOR ART

[Description of the Prior Art] The general configuration of the conventional image reader is shown in drawing 6. This image reader equips the top-face section of a case 90 with the plate-like transparency plate 97 called cover glass, and the substrate 92 in which two or more LED light sources 91 were carried, the lens array 93 which tied two or more lenses for image formation to a single string, and the substrate 95 in which two or more photo detectors 94 were carried are attached to the interior of this case 90. Two or more above-mentioned LED light sources 91 separate spacing suitable on a substrate 92, and are put in order by the single tier so that light can be irradiated to the image reading field Sa of the shape of Rhine of the front face of the transparency plate 97. The above-mentioned lens array 93 is inserted in the slot 98 formed in the above-mentioned case 90.

[0003] In this image reader, if the light irradiated towards the image reading field Sa from two or more LED light sources 91 is reflected by Manuscript D, after that reflected light converges with a lens on each image formation of the lens array 93, it will be received by two or more photo detectors 94. The photo detector 94 of these plurality outputs the picture signal of the output level corresponding to the light income. therefore, the image of Manuscript D -- every one line -- a ** -- it can read.

[0004] In the above-mentioned conventional image reader, the clearance S3 is formed between the top face of the lens array 93, and the rear face of the transparency plate 97. In order to carry out image formation of the image of Manuscript D appropriately on a photo detector 94 with each lens of the lens array 93, in the former, it considered as such a configuration because it was necessary to set the distance L from the front face of the transparency plate 97 to the top face of the lens array 93 as a predetermined distance corresponding to the property of a lens. Although it became possible to lose the above-mentioned clearance S3 when the thickness of the whole transparency plate 97 was very large, in the former, from a viewpoint of low-cost-izing of components, or lightweight-izing etc., the actual condition uses the thing comparatively thin as a transparency plate 97, and the clearance S3 was inevitably formed between the above-mentioned lens array 93 and the transparency plate 97.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, the following faults were produced in the above-mentioned conventional image reader.

[0006] That is, since the above-mentioned lens array 93 was formed in the ***** configuration which bends and is easy to produce deformation, when a temperature change arose in the periphery of the lens array 93 at the time of use of an image reader, as shown in the imaginary line of drawing 7, it had the case where the lens array 93 bent in the direction of the above-mentioned clearance S3, and produced deformation (curvature deformation). Moreover, when an image reader was assembled and it was not pushed in appropriately in the above-mentioned lens array 93 fang-furrow section 98, there was also a possibility that it might be attached in a case 90 while the lens array 93 had produced bending deformation as mentioned above. Consequently, in the former, it could originate in deformation of such a lens array 93, the location gap of each lens of the lens array 93 could arise, image formation of the manuscript image could not be carried out appropriately on a photo detector 94, and there was a case where the so-called blur was produced in a reading image.

[0007] The invention in this application makes it the technical problem to enable it to prevent appropriately the situation where are invented under such circumstances, originate in curvature deformation of a lens array, read, and the quality of an image deteriorates, with a simple means.

[0008]

[Description of the Invention] In order to solve the above-mentioned technical problem, the following technical means are provided in the invention in this application.

[0009] The image reader offered by the invention in this application A case, the transparence plate with which this case was equipped, and the light source which irradiates light to the image reading field of the shape of Rhine of the front face of this transparence plate, The lens array which has two or more lenses for image formation for converging the light reflected from the manuscript arranged to the above-mentioned image reading field on two or more photo detectors allotted to seriate, and carrying out image formation of the image of the above-mentioned manuscript is provided. This lens array is an image reader which was held in the slot prepared in the above-mentioned case, and has countered the above-mentioned transparence plate. And in the rear face of the above-mentioned transparence plate The above-mentioned lens array is characterized for the height which contacts the above-mentioned lens array possible [press] to be formed in the direction of a pars basilaris ossis occipitalis of the above-mentioned slot.

[0010] In the invention in this application, the above-mentioned lens array is maintainable in the condition of having pressed in the direction of a pars basilaris ossis occipitalis of the above-mentioned slot, by being in contact with the lens array by which the height of a transparence plate is held in the slot of a case. Therefore, even if it is the case where a temperature change arises in the periphery of the above-mentioned lens array unlike the former, it originates in it and the above-mentioned lens array can be prevented from producing curvature deformation easily. Moreover, when a case is equipped with a transparence plate on the occasion of the assembly of an image reader, the height of this transparence plate will contact a lens array, a lens array can be pressed, and it also enables it to cancel to be attached to a case, while the lens array had produced curvature deformation. Consequently, in the invention in this application, a possibility that it may originate in deformation of a lens array and a location gap may arise on each lens for image formation is abolished, or it lessens, and a reading image with high quality with few so-called blurs is obtained, and the thing of it can be carried out.

[0011] Moreover, since the height of a transparence plate is made to contact a lens array, it is not necessary to enlarge thickness of the whole transparence plate, and if the part in which the height is formed is partially made heavy-gage, it is sufficient [the invention in this

application]. Therefore, enlargement of a transparency plate, increase-ization of weight, etc. can be controlled as much as possible.

[0012] With the gestalt of desirable operation of the invention in this application, while the above-mentioned lens array has the configuration with which two or more above-mentioned lenses for image formation were put in order and held seriate at the holder prolonged in the shape of a straight line, the above-mentioned height is prolonged in the longitudinal direction of the above-mentioned transparency plate in the shape of a straight line, and is formed in it, and the overall-length region at the tip of the above-mentioned height is in contact with the side edge section prolonged in the longitudinal direction of the end side of the above-mentioned holder.

[0013] According to such a configuration, since the height and the lens array of a transparency plate can be made to contact over the long dimension field of the longitudinal direction of a lens array, it will become desirable by preventing curvature deformation of a lens array. Variation seems moreover, to originate in the difference of physical relationship with a lens array and the height of a transparency plate, and to be able to avoid being generated in the incidence situation of the light to the lens for image formation etc., since the relative physical relationship of a lens array and the height of a transparency plate can also be arranged with the everywhere same conditions in the longitudinal direction of a lens array. Therefore, it becomes convenient reading a manuscript image faithfully. Furthermore, since the height of a transparency plate is made to contact the side edge section of the holder of a lens array, the above-mentioned height can be prevented from covering the lens for image formation of a lens array. Therefore, without it seeming that the light reflected from the manuscript passes the height, or is interrupted by the height, direct incidence can be carried out to the lens for image formation, and it becomes possible to read a manuscript image more faithfully.

[0014] With the gestalt of other desirable operations of the invention in this application, while opening which the above-mentioned transparency plate inserts in the above-mentioned case is formed, 1 set or two or more sets of engagement means to make the above-mentioned transparency plate hang on the above-mentioned case so that it may regulate that the above-mentioned transparency plate moves in the direction which deserts the above-mentioned lens array are formed in the peripheral wall section of the above-mentioned transparency plate and the above-mentioned opening.

[0015] According to such a configuration, the transparency plate to a case can be easily attached by making a transparency plate insert in opening of a case, and making a transparency plate hang on a case using 1 set or two or more sets of engagement means. According to the force, it can avoid pushing the above-mentioned transparency plate in the direction which deserts a lens array, and the above-mentioned engagement means can force a lens array appropriately in the slot of a case, even if the force in which a lens array tends to produce curvature deformation towards a transparency plate in order to regulate that a transparency plate moves in the direction which deserts a lens array occurs.

[0016] With the gestalt of other desirable operations of the invention in this application, the above-mentioned transparency plate is a product made of synthetic resin.

[0017] According to such a configuration, it can also perform easily being able to form easily the transparency plate which has the height with resin shaping, and forming an engagement means in the above-mentioned transparency plate. Therefore, manufacture of a transparency plate can be made easy and the manufacturing cost can be made cheap.

[0018] About other descriptions and advantages of the invention in this application, it will become clearer from explanation of the gestalt of implementation of the following invention.

[0019]

[Embodiment of the Invention] Hereafter, the gestalt of desirable operation of the invention in this application is explained concretely, referring to a drawing.

[0020] Drawing 1 is the sectional view showing an example of the image reader concerning the invention in this application. Drawing 2 is the II-II sectional view of Drawing 3 . Drawing 3 is

III-III of drawing 1 . It is a sectional view. Drawing 4 is the IV-IV sectional view of drawing 1 . Drawing 5 is the decomposition perspective view of the image reader shown in drawing 1 thru/or drawing 4 .

[0021] Image reader A of this operation gestalt is constituted as the so-called contact type image sensor. In drawing 1 , this image reader A possesses a case 1, the transparency plate 2, the light reflex member 8, the lens array 3, the light reflex prevention member 4, a substrate 5, two or more LED chips 6, two or more photo detectors 7 and 1, or two or more attachments 51, and is constituted.

[0022] The above-mentioned case 1 has the gestalt prolonged in the fixed direction as it appears in drawing 5 well. The quality of the material of this case 1 is the synthetic resin which made the polycarbonate contain titanium oxide, and the color of that resin is white. Therefore, it is white everywhere [of this case 1 / all]. The rate of a light reflex of the front face of this case 1 is 90% - about 98% of high value. It extends in the longitudinal direction of this case 1, and the pore 10 penetrated in the thickness direction of the case 1 of a parenthesis is formed in this case 1. This pore 10 is a part for forming the optical path 16 for lighting so that it may mention later.

[0023] The above-mentioned transparency plate 2 is a product made of synthetic resin with the high transparency of for example, acrylic resin etc., and the outline configuration of the whole in plane view is formed in the shape of a ** length rectangle. However, two or more projections 21a and 21b for engagement separate suitable spacing in the two side edge sections 20a and 20b prolonged in the longitudinal direction of this transparency plate 2, and are prepared in them. Moreover, the height 22 projected in the shape of facing down is prolonged in the longitudinal direction of this transparency plate 2, and is formed in the rear face (inferior surface of tongue) of this transparency plate 2 at a single string. The above-mentioned height 22 is used for forcing the lens array 3 so that it may mention later.

[0024] The above-mentioned transparency plate 2 is inserted in this top opening 10b so that top opening 10b of the above-mentioned pore 10 may be blockaded, as it appears in drawing 1 well. Two or more projection 11a for engagement and two or more crevice 11b for engagement are formed in the peripheral wall section of the above-mentioned top opening 10b. Two or more above-mentioned projections 11a, 21a, and 21b for engagement and two or more crevice 11b for engagement are equivalent to an example of the engagement means as used in the field of the invention in this application, and each above-mentioned projection 21a for engagement is being engaged from the lower part to each above-mentioned projection 11a for engagement. On the other hand, each projection 21b for engagement is inserted into each crevice 11b for engagement. Thereby, the above-mentioned transparency plate 2 is hung on the case 1 so that it may not escape and separate to the upper part of a case 1. In addition, the width of face of the part in which the projections 21a and 21b for engagement of the above-mentioned transparency plate 2 are formed is larger than the width of face of the above-mentioned top opening 10b. Therefore, when attaching the above-mentioned transparency plate 2 to a case 1, after expanding the width of face of the above-mentioned top opening 10b by applying the force to the upper part of a case 1, and carrying out elastic deformation of the part, the above-mentioned transparency plate 2 is made inserted in the above-mentioned top opening 10b. A platen roller P is arranged in the location which counters the front face (top face) of the above-mentioned transparency plate 2, and Manuscript D is transported along the front face of the above-mentioned transparency plate 2 by this platen roller P.

[0025] The above-mentioned lens array 3 makes much SELFOC lenses 31 for image formation put in order and hold seriate to the holder 30 made of synthetic resin formed in the shape of [which is prolonged in the shape of a straight line / *****] a block. This lens array 3 is inserted in the slot 12 of the shape of top-face opening formed in the above-mentioned case 1, and is arranged under the above-mentioned transparency plate 2. The height 22 of the above-mentioned transparency plate 2 is in contact with the top face of this lens array 3. Thereby,

the above-mentioned lens array 3 is forced below so that it may not come floating upwards. However, the above-mentioned height 22 has contacted only to the 1 side edge section prolonged in the longitudinal direction of this holder 30 among the top faces of a holder 30 so that the SELFOC lens 31 may not be covered. Moreover, the overall-length region at the tip of the above-mentioned height 22 is in contact with a single string to the abbreviation overall-length region except the both ends of the longitudinal direction of a holder 30 as it appears in drawing 4 well. In drawing 1, the right above field of the above-mentioned lens array 3 is the image reading field S among the front faces of the above-mentioned transparence plate 2, and this image reading field S is a field of the shape of Rhine prolonged in the above-mentioned lens array 3 and this direction.

[0026] Two or more above-mentioned photo detectors 7 have a photo-electric-conversion function, and if the light which has passed two or more SELFOC lenses 31 of the lens array 3 from the image reading field S is received, they will output the picture signal of the output level corresponding to the light income. The photo detector 7 of these plurality is put in order and mounted in seriate along with the longitudinal direction of the above-mentioned substrate 5 on the surface of [of the above-mentioned substrate 5] facing up. Down the stowed position of the lens array 3 of the above-mentioned case 1, the space room 13 of the shape of pars-basilaris-ossis-occipitalis opening prolonged in the lens array 3 and this direction is formed. Two or more above-mentioned photo detectors 7 are arranged in the above-mentioned space room 13 by attaching a substrate 5 to the bottom surface part of a case 1. As for the above-mentioned substrate 5, the attachment maintenance to the pars basilaris ossis occipitalis of the above-mentioned case 1 is made by the above-mentioned attachment 51. By being hung on the heights 14 and 14 formed in the lateral surface of a case 1, the above-mentioned attachment 51 is constituted so that the bottom surface part of the above-mentioned substrate 5 may always be pressed upwards.

[0027] The above-mentioned light reflex prevention member 4 is black ABS plastics or the black product made from a polycarbonate, and the front face in each place has become what has the low reflection factor of light. This light reflex prevention member 4 has the array die length of two or more above-mentioned photo detectors 7, an abbreviation EQC, or the die length beyond it, and the general cross-section configuration of that longitudinal direction has the shape of an abbreviation KO character which placed opening upside down. As this light reflex prevention member 4 surrounds the perimeter of two or more above-mentioned photo detectors 7, it is inserted in the above-mentioned space room 13. However, the slit 41 whose advance turns to two or more photo detectors 7 the light which has passed the lens array 3, and is enabled is formed in this light reflex prevention member 4. Anchoring of the light reflex prevention member 4 to a case 1 is performed by making the crevice 15 formed successively in the upper part of the space room 13 carry out fitting of the height 40 prepared in the top-face section of this light reflex prevention member 4. [two or more]

[0028] Two or more above-mentioned LED chips 6 are equivalent to an example of the light source, and are mounted in the same field as the front face of the above-mentioned substrate 5, i.e., the field where two or more photo detectors 7 of the above-mentioned substrate 5 are mounted. The LED chip 6 of these plurality is arranged in seriate by the longitudinal direction of a substrate 5 in the predetermined pitch so that the luminescence field of the shape of Rhine prolonged in a main scanning direction can be formed.

[0029] The above-mentioned substrate 5 is for example, a product made from a ceramic, or a product made of an epoxy resin. The circuit pattern (illustration abbreviation) for performing I/O of the electric power supply to the LED chip 6 and two or more photo detectors 7 of the above-mentioned plurality or various kinds of signals is formed in the front face of this substrate 5, and wiring connection with an external instrument can be made now through a connector 50 as it appears in drawing 5 well. Although the drawing top is omitted, the boundary region where two or more above-mentioned LED chips 6 are mounted among the front faces of the above-mentioned substrate 5 is made into white with the high reflection

factor of light, and let the other field be black with the low reflection factor of light. In drawing 1, the surface part of the substrate 5 which counters the space room 13 is a black field.

[0030] The above-mentioned light reflex member 8 is the white product made of resin which made the polycarbonate contain titanium oxide like the above-mentioned case 1, and the front face of each part is the white side where the reflection factor of light is high. The side-attachment-wall sections 80 and 80 projected in the direction where this light reflex member 8 is prolonged, and the direction which intersects perpendicularly are formed in the longitudinal direction both ends of this light reflex member 8 as it appears in drawing 5 well. The above-mentioned light reflex member 8 is held in the pore 10 of the above-mentioned case 1, and positioning of the above-mentioned light reflex member 8 is achieved by inserting in narrow-width partial 10a by which lower 8a of the longitudinal direction edge of the above-mentioned light reflex member 8 was prepared in the lower part of the longitudinal direction both ends of the pore 10 of a case 1 as it appears in drawing 2 well.

[0031] In this image reader A, the space section of the remainder in which the above-mentioned light reflex member 8 was held among the pores 10 of the above-mentioned case 1 is made into the optical path 16 for lighting. In drawing 1, the space field between the top face of the lens array 3 and the rear face of the transparency plate 2 located in right above [of it] is also made into a part of optical path 16 for lighting. The wall surfaces 16a and 16b prolonged in the longitudinal direction of the case 1 of the above-mentioned optical path 16 for lighting are formed of one side face of the above-mentioned light reflex member 8, and the 1 side-attachment-wall side of the above-mentioned pore 10. Two or more above-mentioned LED chips 6 are arranged at the lower part of this optical path 16 for lighting. Since this optical path 16 for lighting is a part for leading the light emitted from two or more LED chips 6 to the image reading field S, let those parts at least be inclined planes so that you can advance the wall surfaces 16a and 16b of this optical path 16 for lighting towards the image reading field S by reflecting the light emitted from two or more LED chips 6. The above-mentioned wall surfaces 16a and 16b continue being white sides where both the rates of a light reflex are high. The surface field of the substrate 5 which counters the above-mentioned optical path 16 for lighting is also white.

[0032] The longitudinal direction both ends of the above-mentioned optical path 16 for lighting are prescribed by one side face 81 of each side-attachment-wall section 80 of the above-mentioned light reflex member 8, and this one side face 81 and the wall surface 17 of the case 1 formed in the shape of abbreviation flat-tapped as it appears in drawing 3 well. These fields 81 and 17 are also white sides where the reflection factor of light is high. Point 80a of each side-attachment-wall section 80 of the above-mentioned light reflex member 8 is advancing between the longitudinal direction edge of the lens array 3, and the longitudinal direction edge of the transparency plate 2, and is suppressing the longitudinal direction both ends of the lens array 3 below as it appears in drawing 2 and drawing 4 well. This will play the role which assists the height 22 of the transparency plate 2 which suppresses the lens array 3 below. Moreover, 1 side-face 81 of above-mentioned point 80a has met the optical path 16 for lighting between the above-mentioned lens array 3 and the transparency plate 2 by arranging point 80a of each above-mentioned side-attachment-wall section 80 above the lens array 3 in this way.

[0033] Next, an operation of the above-mentioned image reader A is explained.

[0034] First, in drawing 1, among the light emitted from two or more LED chips 6, the part turns the inside of the optical path 16 for lighting to the image reading field S, and advances directly. Moreover, the light of other most is efficiently irradiated by the image reading field S, being reflected by the wall surfaces 16a and 16b of the white prolonged in the longitudinal direction of the optical path 16 for lighting with a high reflection factor. On the other hand, as shown in drawing 3, the light emitted from two or more above-mentioned LED chips 6 advances with breadth also to the longitudinal direction of the optical path 16 for lighting. The light which advanced towards the longitudinal direction both ends of the optical path 16

for lighting is reflected by the side faces 81 and 81 of the white of the side-attachment-wall sections 80 and 80 of the light reflex member 8 with a high reflection factor, and a part of the reflected light arrives at the image reading field S. In this case, many of light reflected near the upper part of the above-mentioned side faces 81 and 81 and the upper part advances towards the longitudinal direction both ends of the image reading field S. Since side-face 81 of point 80a of each above-mentioned side-attachment-wall section 80 a is located up and is approaching the image reading field S rather than the lens array 3 as especially shown in drawing 2 and drawing 4, the light which reached the above-mentioned side-face 81a is efficiently reflected towards the longitudinal direction edge of the image reading field S. Therefore, the exposure of the light to the longitudinal direction both ends of the image reading field S can be increased. When light is generally irradiated to a Rhine-like image reading field using the light source which emits light to a line, the inclination for the exposure quantity of light to the longitudinal direction edge of an image reading field to become less than the exposure quantity of light of a longitudinal direction center section considerably is strong. However, in this image reader A, such fault is canceled and it becomes possible to attain equalization of the exposure quantity of light to longitudinal direction every place of the image reading field S.

[0035] In above-mentioned image reader A, the protection-from-light field La where the exposure of light was prevented is formed in the inferior surface of tongue of the transparency plate 2 of the upper part of the light reflex member 8. This protection-from-light field La plays the role which prevents that light is vainly irradiated by the part which is considerably distant from the image reading field S among each part of the transparency plate 2. Therefore, it becomes possible to raise more the exposure effectiveness of the light to the image reading field S.

[0036] It is reflected by the front face of the manuscript D located in this image reading field S, and after the light which advanced to the above-mentioned image reading field S penetrates each SELFOC lens 31 of the lens array 3 after that and advances in the space room 13, it is received by two or more photo detectors 7. Since each above-mentioned SELFOC lens 31 is not covered with the height 22 of the transparency plate 2, as it is not influenced of the height 22 of the transparency plate 2, it can carry out incidence suitable for each SELFOC lens 31 about the reflected light from the above-mentioned manuscript D.

[0037] Moreover, the above-mentioned height 22 is in contact with the longitudinal direction to the lens array 3 at a single string, and that of the relative physical relationship of the lens array 3 and the height 22 is uniform in longitudinal direction every place of the lens array 3. For this reason, it results from the variation in the physical relationship of the lens array 3 and the height 22, and can avoid also producing fault which variation produces in the illuminance of the image reading field S, or variation produces in the incidence situation of the light to the SELFOC lens 31. When the above-mentioned height 22 is formed intermittently, the method of advance of the light which goes to the image reading field S is more specifically different in the optical path 16 for lighting in the part in which the height 22 exists, and the part in which the height 22 does not exist. Moreover, the conditions in which the light reflected from Manuscript D carries out incidence to the SELFOC lens 31 will also be different. However, such a thing can be abolished in this image reader A.

[0038] Since the perimeter of two or more above-mentioned photo detectors 7 is covered with the black light reflex prevention member 4 with the low rate of a light reflex, it is controlled that the reflected light from Manuscript D carries out scatter reflection in the perimeter of two or more above-mentioned photo detectors 7. Therefore, it can also be prevented that the scattered light carries out incidence to each photo detector 7, it can read also according to such a thing, and the quality of an image can be raised.

[0039] In above-mentioned image reader A, change arises in the ambient temperature of the lens array 3 during the use, and even if it is going to produce curvature deformation so that the longitudinal direction center section of the lens array 3 may be raised upwards, such

deformation can be appropriately prevented by the height 22 of the transparency plate 2. When the above-mentioned lens array 3 tends to produce curvature deformation, the transparency plate 2 receives the force pushed up upwards by this lens array 3, but since the above-mentioned transparency plate 2 is hung on the condition that the migration to the upper part of a case 1 was regulated by the case 1, it can prevent deformation of the above-mentioned lens array 3 appropriately. Moreover, although it attaches the transparency plate 2 to a case 1 in the condition of making the lens array 3 inserting in the slot 12 of a case 1 in assembling the above-mentioned image reader A, the height 22 of the transparency plate 2 will press the top face of the lens array 3 inevitably at the time of attachment of this transparency plate 2. Therefore, it also becomes possible to turn the lens array 3 to the pars basilaris ossis occipitalis of a slot 12, and to push it in certainly, and a possibility that it may be attached to a case 1 while it has been in the condition by which the lens array 3 was bent can also be canceled. Therefore, the location of each SELFOC lens 31 of the lens array 3 can be set as a proper location, and image formation of the image of Manuscript D can be carried out suitable for the condition that there is no blur on a photo detector 7.

[0040] the concrete configuration of each part of the image reader concerning the invention in this application is not limited to an above-mentioned operation gestalt, but a design change is free for it to versatility.

[0041] For example, with the above-mentioned operation gestalt, although he is trying for the height of a transparency plate not to cover the lens for image formation of a lens array, the invention in this application is not limited to this. In the invention in this application, it may be in contact with the lens array so that the height of a transparency plate may cover the lens for image formation, for example. When the transparency of a transparency plate is high, even if it is the case where the height is made to contact on everywhere equal conditions to two or more lenses for image formation, it is possible to perform good image reading. Therefore, in the invention in this application, especially the concrete cross-section configuration or the size of the above-mentioned height are not limited, either. Moreover, in the invention in this application, a means to paste up a transparency plate on a case, for example, using adhesives as a means to equip a case with a transparency plate may be adopted.

[0042] Furthermore, with the above-mentioned operation gestalt, in a case 1, although the exposure effectiveness of the light to an image reading field is raised as a white product made of resin, the invention in this application is not too limited to this, for example, the case made of black resin may be used like the image reader of the general former. It is not limited to what the configuration of the light source also consisted of using two or more LED chips, for example, the invention in this application can use the various light sources, such as a cold cathode tube. Moreover, as a lens array, the thing not only using what used the SELFOC lens as a lens for image formation but a convex lens may be adopted.